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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/539,279	06/16/2005	Masaaki Nagatsu	31721-219467	7365

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EXAMINER	
FORD, NATHAN K	

ART UNIT	PAPER NUMBER
1709	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/539,279	NAGATSU, MASAAKI	
	Examiner	Art Unit	
	Nathan K. Ford	1709	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/16/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al., US 5,698,036, in view of Murakawa et al., US 6,388,632, and Tanaka et al., US 4,970,435.

Claim 1: Ishii teaches a microwave plasma generator comprising the following:

- A microwave source (50) to generate an excitation microwave (5, 30-35);
- Gas sources (36, 38; Fig. 1);
- A plasma generation vacuum vessel supplied with a gas from the gas sources (Fig. 1);
- A coaxial waveguide (52) to introduce the excitation microwave into the vessel (10, 35ff);
    - Wherein the waveguide is hermetically sealed by the vacuum vessel (5, 40-49);
- A first conductor plate (82) connected to an outer conductor of the coaxial waveguide (11, 55-60);
- A dielectric plate (80) (11, 54-60);
- A second conductor plate (44) connected to a central conductor of the coaxial waveguide (Fig. 15; 5, 50ff);
    - Wherein the second conductor plate has a plurality of openings (60) to emit microwaves into the vessel (Fig. 2A);
- A recess, or resonant cavity, constructed in the manner disclosed by the applicant (11, 61ff);

Ishii does not teach the plurality of openings in the second conductor plate as being circular, but it is well-known in the art to shape such openings circularly (Fig. 14; 7, 60-67 – Murakawa). Thus, it would

have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ishii's conductor plate openings to that of a circular shape as disclosed by Murakawa given the latter's indication as to the suitability of such a construction for purposes of plasma deposition.

Ishii does not teach a movable waveguide. Tanaka, disclosing a plasma processing apparatus, teaches a slidable waveguide (92) to maximize particular current values (7, 65-68; 8, 8-12). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the waveguide of Ishii to facilitate its movement in the manner disclosed by Tanaka to maximize current values.

Ishii does not teach the isolation of the resonant cavity from the vessel by availing o-rings disposed between the first conductor and dielectric plates. However, Ishii has previously disclosed the use of o-rings (56) to hermetically seal the waveguide pipe through its intersection with the vessel ceiling (54). Given this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to seal Ishii's resonant cavity with o-rings to maintain a hermetic boundary between the cavity and the vessel.

Claim 2: The remarks under claim 1 address the limitations of claim 2 directed to the coaxial waveguide. Figure 1 of Ishii delineates a substrate support (6) disposed at a position facing the second conductor plate (44). The combination of Tanaka and Ishii under claim 1 teaches the adjustment of the distance between the plate and support.

Claim 3: Ishii's processing chamber is cylindrical (4, 20-25). Tanaka's waveguide intersects the chamber on its central axis; the waveguide must therefore move along the centerline of the chamber. The outline of Ishii's first conductor plate (82) is nominally smaller than the inner diameter of the chamber (Fig. 14).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii in view of Murakawa and Tanaka and in further view of Okumura et al., US 6,346,915.

Ishii does not teach the cylindrical portion described by the applicant. Figure 1 of Okumura, who discloses a plasma processing apparatus, delineates a cylindrical portion (13) extending downward and peripherally as explained by the applicant. Further, the cylindrical portion bounds a plasma emission gap (14); the gap controls the plasma distribution on the substrate (2,52-57; 6, 19ff). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to supplement Ishii with the cylindrical portion as disclosed and arranged by Okumura to control the plasma distribution on the substrate.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii in view of Murakawa and Tanaka and in further view of Noda, US 5,395,453.

Ishii teaches a microwave source (50) but does not teach a microwave-source driving device to modulate the pulse of the source (50) and effect intermittent driving. Noda, disclosing an apparatus for controlling the oscillation output of a magnetron, teaches microwave source (10) and a driving device (21) to control the pulse output of the source (7, 29-34). The device (21) effects intermittent pulse timing (8, 27ff). Given this, it would have been obvious to one of ordinary skill in the art at the time the invention was made to supplement Ishii's microwave source with the microwave-source driving device of Noda to control the pulse output of the microwave source and effect intermittent pulse driving.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan K. Ford whose telephone number is 571-270-1880. The examiner can normally be reached on M-F, 8:30-5:00 EDT. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

nkf

JENNA BEFUMO
PRIMARY EXAMINER

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